Business to business (B2B) alliances in the healthcare industry: a review of research trends and pertinent issues

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Abstract

Purpose – This study aims to find, analyse and synthesise the body of literature on how different health-care businesses form business-to-business (B2B) alliances. By doing so, this study seeks to identify visible research gaps to suggest future research questions and develop a conceptual framework to set a future research agenda.

Design/methodology/approach – The study uses the time-tested systematic literature review method to identify 57 studies that have addressed B2B relationships in the health-care industry. Thereafter, a qualitative analysis is performed to delineate the research profile and synthesise the key themes examined in the selected studies.

Findings – The qualitative analysis uncovers two key thematic foci: types and purposes of B2B relationships and pertinent issues in continued B2B relationships. Within these themes, the authors highlight different types of firms and their reasons for engaging in B2B relationships. The authors also summarise various issues that these firms deal with in such relationships. Finally, the authors highlight the limitations in the existing research and suggest future research questions to address them. The findings are summarised in a conceptual framework.

Originality/value – Although several reviews exist that evaluate the state-of-the-art research on B2B relationships, very few have examined the same in the context of health care. This review adds value to the research by providing a comprehensive overview of the existing findings in the area to encourage future research through a conceptual framework.

Keywords B2B, Alliances, Systematic review, Health care

Paper type Literature review

1. Introduction

The health-care industry is a high-tech industry characterised by high uncertainty and technological turbulence (Anand *et al.*, 2010; Sivakumar *et al.*, 2011). Given that some of the activities undertaken in the sector, such as research and development (R&D), are highly complex, with the results often being distant into the future, business partnerships are an attractive option in terms of greater cost-effectiveness and decreased uncertainty (Zeng *et al.*, 2019). The unprecedented challenges imposed by the ongoing COVID-19 pandemic have further accentuated the importance of business alliances by exposing the glaring insufficiencies of existing health-care systems. Thus, it is hardly surprising that the pandemic has catalysed the emergence of new business-to-business (B2B) relationships in this sector (Crick and Crick, 2020). As of January 2021, for instance, one of the most used COVID-19 vaccines, the AstraZeneca vaccine, has been developed through the R&D cooperation between AstraZeneca, a pharmaceutical firm and Oxford University and is manufactured by multiple manufacturers around the world (AstraZeneca, 2020). Furthermore, many partnerships have also evolved to support the distribution and administration of the vaccine.

Further, given the dynamic landscape and ever-mutating business needs, scholars have increasingly focussed on

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understanding how businesses work with one another, especially over the past two decades. Within this body of literature, B2B relationships in industries such as health care have received notable attention (de Leeuw *et al.*, 2019; Roijakkers *et al.*, 2005). Interestingly, the majority of the existing studies on B2B relationships in health care have examined the R&D alliances of pharmaceuticals firms (Diestre and Rajagopalan, 2012; Djurian *et al.*, 2020; Zeng *et al.*, 2019). Although the literature is quite rich, it is difficult to grasp as the findings are scattered across publications and contexts. Consolidating the existing state of the art in the area could thus prove to be quite useful as it would create a platform for future research to build upon. We contend that such a significant body of literature warrants a comprehensive review of the accumulated knowledge. Due to this, we propose to undertake a systematic literature review (SLR) of the existing literature in the area.

Admittedly, several reviews exist in the B2B context (Aarikka-Stenroos and Ritala, 2017; Keränen *et al.*, 2012; Pandey *et al.*, 2020). However, their scope is wide as it spans multiple industry verticals without specifically focussing on any one sector, such as health care. As such, the available synthesis lacks the granularity and targeted insights to be particularly useful for theory and practice in specific verticals. Our SLR is intended to remedy this lack of focussed insights by searching, selecting, cataloguing and synthesising the existing body of literature on B2B relationships in the health-care industry. Specifically, we seek to contribute to the academic discussion by highlighting the uniqueness of the high-tech context of this sector. The results of the study are also expected to help managers and strategists identify the most common type of B2B relationships in health care and the complex aspects of managing such relationships. Overall, our review is guided by two research objectives (*ROs*):

RO1. To understand and analyse the evolution of the literature examining B2B relationships in the health-care industry.

RO2. To uncover the potential areas that require more intense research focus in the future to enable the sector to deliver on the promise it holds.

To achieve these research objectives, we generated the research profile of the existing literature and also extracted the common themes. Ultimately, two key themes emerged:

1 the types and purposes of B2B relationships; and
2 the pertinent issues in continued B2B relationships, with several subthemes also emerging in our analysis.

Furthermore, we critically evaluated the literature to uncover the visible gaps and limitations and suggested potential research questions (PRQs) to be addressed in the future. Finally, to consolidate the learnings, we summarised our findings in a conceptual framework entitled "B2B health-care ecosystem framework". The results of the review indicate that the literature on B2B relationships in health care has received significant attention in the past 20 years, with 57 research articles published on the topic. We observe that majority of the contribution comes from the strategic management literature, which focusses predominantly on examining alliances, with the health-care sector just being an incidental context. The results of those studies are largely interpreted without special emphasis on the health-care sector. Therefore, we call for new research that consciously focusses on the intricacies of the health-care sector. This is extremely important in light of how the COVID-19 pandemic has propelled health care to centre stage and made it a critical part of both the geopolitical and economic landscape.

The rest of the article is structured as follows. Section 2 presents the scope of the review. Section 3 gives an overview of the SLR method used in the study, followed by the presentation of the research profile and thematic foci in Section 4. Relevant research gaps and PRQs are discussed within these sections. Next, a conceptual framework, the B2B health-care ecosystem framework, is presented in Section 5. The manuscript concludes with Section 6, wherein the implications, limitations and future research potential are discussed.

2. Scope

The current review is focussed on two key aspects as follows:

1 the health-care industry/sector; and
2 the B2B relationships in this industry.

Accordingly, we have defined the scope of this review in terms of both, i.e. what constitutes the health-care industry and what the boundary conditions are in defining B2B relationships. To begin with, we explicate what constitutes the health-care industry. In this regard, we take a broad view of the health-care industry/sector to include all firms that are involved in the creation and delivery of medical products and services to customers. Thus, the health-care industry, as defined in the present context, includes all types of medicine and health-care-related firms, such as pharmaceuticals, biotechnology, hospitals, medical device manufacturers and clinical research agencies.

With regard to B2B relationships, we contend that to fully appreciate what such relationships entail, there is first a need to have a clear understanding of the various aspects of such transactions. Indeed, scholars have argued that every transaction has associated search, bargaining and policing costs (David and Han, 2004; Williamson, 2002). The level of these transaction costs depends on how their respective transactions are organised and structured. Transaction cost economics (TCE; Williamson, 1979) is a well-established theory that addresses the issue of how transaction value may be created and transaction costs minimised through alternative governance structures (Williamson, 1979). The governance structure for contractual relationships between parties of a transaction can be one of three types as follows:

1 open market transaction;
2 hybrid structures; and
3 hierarchy (Williamson, 1979).

Market transaction refers to a one-time contact with no long-term relationship in the open market. Conversely, hierarchy refers to performing a transaction within the bounds of a structure popularly called a *firm*. All other structures of contractual relationships, including all types of alliances and relationships, fall under the scope of hybrid governance structures. Williamson (1979) argued that the nature of these

contractual relationships is decided on the basis of three factors:

1 the asset-specific investments required;
2 the extent of uncertainty in the transaction; and
3 the frequency of the transaction.

Transactions that are frequent have high uncertainty and require high asset-specific investment, thereby making them suitable for the hierarchy type of governance structure. In comparison, transactions with no asset-specific investment, low uncertainty and of a non-frequent nature are suitable for the market transaction structure. In the grey area between these two modes of transaction/governance structures lie a myriad of B2B relationships that are set up for different purposes. These relationships can take varied forms, ranging from repeated buyer-seller relationships to joint ventures. Mergers and acquisitions, however, are not considered in this review because the B2B transactions in these cases actually become transactions that take place within a firm. In light of the preceding discussion, we define B2B relationships as hybrid relationships that are formed between firms in the health-care industry. Furthermore, we recognise that B2B relationships do not solely imply a dyadic relationship between two firms. Thus, we also include B2B networks with more than two firms (Zolkiewski, 2011) as part of B2B relationships in our review. Finally, in appreciation of the fact that hybrid relationships are likely to have issues arising from information asymmetry due to bounded rationality and opportunism related to incomplete contracts (Ryu *et al.*, 2020; Williamson, 1979), we consider different types of issues that can arise in such relationships, such as misappropriation of value, free riding and powerful dynamism.

3. Methodology

The SLR method is a very popular method of searching, short-listing, selecting and analysing relevant studies and has been used by many recent studies (Dhir *et al.*, 2020; Talwar *et al.*, 2021). SLRs are often preferred to narrative reviews due to their easy replicability (Khanra *et al.*, 2020) and their ability to reduce researcher bias in the selection and analysis of the relevant literature (Kushwah *et al.*, 2019; Seth *et al.*, 2020). Thus, our choice of this method for the present study is also guided by the fact that the method has already been effectively used in the B2B context (Dobrucalı, 2019; Mustak, 2014).

We used a three-step approach to execute the review are as follows:

1 defining the research questions to achieve the objectives of the review;
2 setting the search protocol through identifying the relevant keywords, determining the inclusion/exclusion criteria and searching the databases; and
3 evaluating the studies short-listed through the search protocol.

3.1 Defining research questions

The key objectives of our review are evaluating how the literature addressing B2B relationships in the health-care industry has evolved over the years and identifying the potential areas that need to be focussed upon in future research. To achieve these research objectives, we have delineated four research questions:

RQ1. What is the research profile of the existing studies?

RQ2. What are the different kinds of firms and their reasons for engaging in B2B relationships?

RQ3. What are the gaps and limitations that exist in the current literature?

RQ4. How can the research in the area be taken forward?

We addressed *RQ1* by using the defined search protocol to identify relevant studies and generate their research profile. To address *RQ2*, we undertook a content analysis of the selected studies to determine the common themes. Next, we responded to *RQ3* by evaluating the identified literature as a whole to uncover the visible gaps in the literature. Finally, we addressed *RQ4* by outlining the PRQs that need to be addressed by future researchers and by developing a conceptual framework to provide an overview of the accumulated findings and set the future research agenda.

3.2 Setting the search protocol and searching the databases

A search protocol is required to guide the process of study selection. It has two key components, namely, keyword identification and determination of the inclusion/exclusion criteria. In concordance with the conceptual boundary of our review (i.e. B2B relationships in the health-care industry), we first searched the keywords "B2B" and "health care" on Google Scholar and read the title, abstract and keywords of the first 100 most relevant research articles sorted by the tools' algorithm. Based on this analysis, we identified several other keywords that would make our search of the relevant literature more comprehensive. Thus, we prepared the final list of keywords for the literature search to include: "health*", "hospital*", "pharma*", "biopharma", "B2B" "business to business", "business-to-business", "interfirm", "industrial marketing" and "business marketing". Next, we set detailed inclusion-exclusion criteria for identifying relevant studies, as suggested by recent SLRs (Kushwah *et al.*, 2019). Accordingly, the inclusion criteria were set as:

- studies discussing some aspects of B2B relationships between different types of firms in the health-care industry;
- peer-reviewed studies published after the year 2000; and
- studies empirically examining the proposed relationships.

Similarly, the exclusion criteria were defined as:

- conference proceedings, editorials, reviews and non-peer-reviewed articles;
- research articles published in languages other than English; and
- duplicate studies based on digital object identifiers or titles.

Using the identified keywords, we searched two leading digital databases of scholarly publication, Scopus and Web of Science (WOS). The search yielded 316 studies in WOS and 450 studies in Scopus, respectively.

3.3 Evaluating the studies short-listed through the search protocol

We first applied the inclusion and exclusion criteria to the studies identified through the search of the two databases for preliminary short-listing. Consequently, we were left with a joint pool of 583 studies. We then proceeded to the next round of filtering the studies by evaluating their titles and abstracts, wherein we identified 165 articles to take forward for further assessment. Finally, we read the full text of these 165 research articles to gauge their relevance and identified 57 relevant research articles to be reviewed.

We used Atlas.ti along with Mendeley reference manager to collect and analyse these 57 articles. Each author independently read all of the articles to synthesise the relevant details. Specifically, the following information was collected for each article: publication source, publication year, country context, type of health-care firm investigated and methodology. This information was then used to generate the research profile of the articles, as presented below. A detailed content analysis to identify the key themes was also performed on the articles, which is similarly presented in Section 4. The related research gaps and PRQs have also been presented in the following section, along with the discussion of the research profile and themes.

4. Research profile

We generated the research profile of the selected articles in terms of their descriptive statistics, including the publication source, publication year, the country context of the study, the types of firms investigated and the methodology used. Firstly, with regard to the source, we observed that the *Journal of Business and Industrial Marketing* had the greatest number of research articles with nine research articles on B2B relationships in the health-care industry. This was closely followed by a notable number of publications in the *Research Policy and Strategic Management Journal*, indicating that a significant number of articles in the area have been published in the strategic management literature. However, these types of studies have primarily focussed on alliances as a type of B2B relationship, with the health-care sector emerging as an incidental but popular industry to investigate. The list of the journals with a minimum of two research articles is given in Figure 1 below.

Coming to the year-wise trend of publication, the area is currently resurging, as seen in the bimodal distribution diagram presented in Figure 2. It is quite apparent that the number of studies has been growing steadily and can be expected to increase in 2021.

Regarding the country context of the investigations under review, we observed that the majority of the studies have been from the United States of America (USA). This can perhaps be attributed to the fact that most of the B2B studies have been on innovation output, with rich data being readily available for patents filed in the USA. Such a skew in the country context, however, indicates that the theoretical implication of these studies may be biased. Furthermore, we observed that the majority of these studies used the COMPUSTAT database, which implies that the data has also come primarily from the same source (Dan and Zondag, 2016; Djurian *et al.*, 2020). Countries investigated at least twice in the short-listed studies are presented in Figure 3.

Regarding the types of health-care firms, we observed that several types of health-care firms were examined, including pharmaceutical firms, hospitals, pharmacies, clinics, nursing homes, biotechnology firms, medical devices manufacturers. Furthermore, a variety of non-health-care partners for health-care industries have also been investigated.

In terms of the methodology of the study, we observed that the majority (37 studies) used a quantitative methodology, with 28 of these using regressions to test their hypotheses. Only 20 studies, by contrast, used qualitative methods.

Whilst a comprehensive evaluation of the research profile revealed interesting trends, it also indicated certain gaps and limitations that can serve as the basis for conceptualising future research. The key limitations related to the scope and methodology used by these studies are discussed below.

4.1 Limitations and gaps related to scope and methodology

There are three main gaps or limitations in the scope and methodology of the identified studies that need to be noted:

4.1.1 Skewed geographical scope

The majority of the studies have based their research on pharmaceutical firms in the USA (Dan and Zondag, 2016) and the United Kingdom (UK), with very few studies in the Asian context. The lack of variety as far as country context is concerned indicates that countries in other regions have not been considered adequately. In fact, there is quite a visible gap in findings related to emerging market countries such as China, South Korea and India, which have been reporting notable successes in managing health-care crises during the COVID-19 pandemic. The few studies that have considered Asia as the

Figure 1 Publication source

Figure 2 The year-wise trend of publication

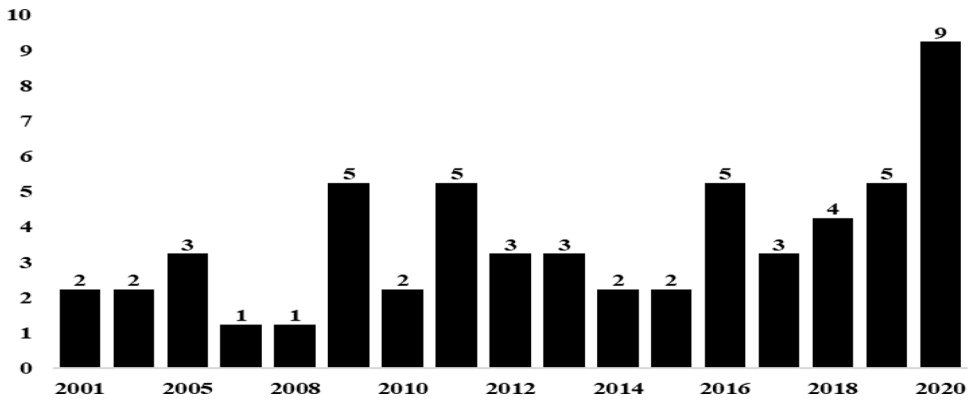
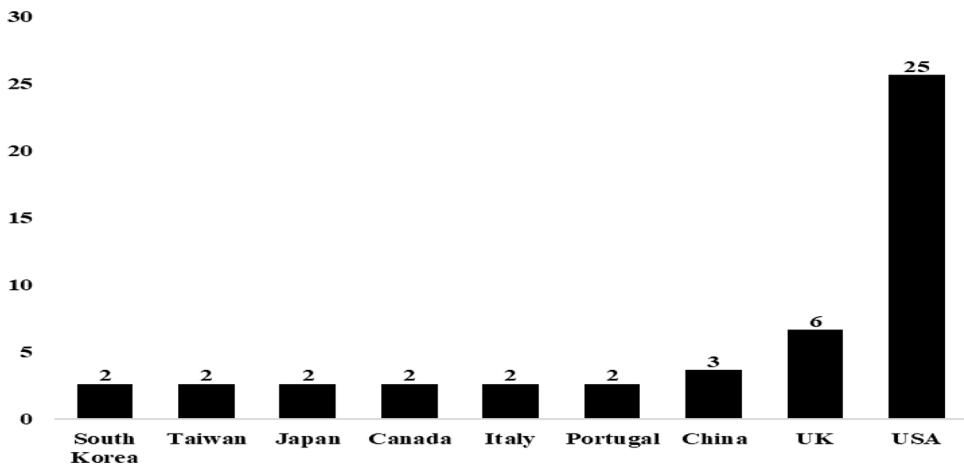


Figure 3 Country context investigated



geography of interest have focussed on the Chinese and South Korean context (Shin *et al.*, 2016; Sohn *et al.*, 2013). This is quite concerning as the results of the studies conducted in the context of firms based in the USA and UK may not be generalisable to other geographies due to their various disparities. Particularly, as the literature acknowledges that the existence of cultural differences amongst different countries has a bearing on behaviours, including the importance assigned to partnerships and cooperation (Chen *et al.*, 2021; Hofstede and Hofstede, 2005), this disparity in the geographical focus limits the literature quite critically. At the same time, this limitation opens up new opportunities for studies focussing on various countries, such as India, Japan and China, which have collectivist cultures, as opposed to the individualistic cultures of the USA and UK. Some PRQs that can be addressed in this regard are:

PRQ1. Do the results of the studies undertaken in the USA and the UK hold in countries with different cultures?

4.1.2 Lack of industrial diversity in the samples

The second methodological issue that can be observed in the studies reviewed is the limited variety in the type of firms examined. For instance, only a subset of health-care-related firms such as large pharmaceutical firms have been considered in the majority of the literature (Rothaermel and Boeker, 2008). This implies that there is a lack of studies providing insights into various verticals, firm characteristics and alliance partners. We suggest the following PRQs address this gap in the literature:

PRQ2. Does the nature of the organisations involved in the alliance impact the outcomes, and, if so, how?

PRQ3. How do the dynamics of alliance evolve for different types of firms in the industry, such as a hospital versus a pharmaceutical firm?

PRQ4. What are the issues that emerge in different types of alliances, such as the partnership between two health-care firms versus the partnership of a health-care firm with a non-health-care firm?

PRQ5. How does firm size impact the outcomes of the B2B relationship?

4.1.3 Dependency on secondary data

Most studies included in the review based their analysis on secondary data. Although it can be argued that organisation-level data is more difficult to capture as primary data, the over-

dependence on secondary data leads to a predictable pattern in the outcomes examined. In this regard, we observed that a majority of the studies had examined R&D collaborations, whilst personnel-level issues that could better be captured by primary data have not been addressed adequately in the existing literature.

We propose the following questions that can be addressed to bridge this gap in the literature:

PRQ6. What are the various issues such as conflicts and other managerial and staff-level issues that arise in B2B relationships in the sector?

PRQ7. What are the micro-level factors influencing the personnel and human resources aspect of B2B relationships?

5. Thematic foci

We performed a detailed content analysis to uncover the most prominent themes in the reviewed literature. Each of the authors coded the short-listed articles to identify the thematic foci. After each round of coding (open and axial), we discussed the codes and finally arrived at the thematic clusters. Atlas.ti was used to perform the coding process as it allows for easy coding and synthesising of codes. Coding conflicts were resolved through discussion to arrive at a consensus. Finally, two thematic clusters were identified as follows:

- the types and purposes of the B2B relationships; and
- the pertinent issues in continued B2B relationships.

In addition, we also synthesised the findings, limitations and gaps in each study to suggest PRQs to guide future researchers.

5.1 Types and purposes of business-to-business relationships

B2B relationships can be classified based on two main parameters:

1 the nature of the partners; and
2 the purpose of the relationship.

Several types of relationships and interrelationship networks exist in the health-care industry. Laing and Lian (2005) summarised this structure and provided a classification of relationships in health services. Although their classification is still quite relevant as it is based on the extent of interaction between the partners, it does have two main limitations. Firstly, their classification was only for dyadic relationships or B2B relationships with two partners, thus providing only a partial structure to the nature of relationships. Secondly, it was only for service health-care firms. Our review, thus offers broader coverage by considering product firms such as pharmaceuticals as well. Furthermore, we provide a classification based on the purpose and nature of partners.

5.1.1 Nature of the partners

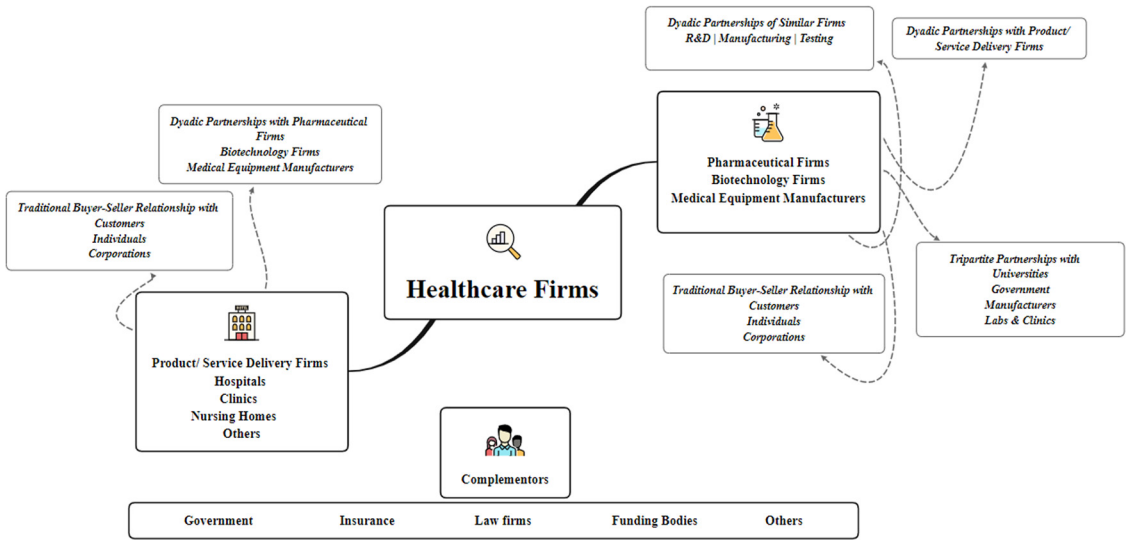
The delivery of health care is a complex activity that involves several types of businesses. Therefore, a variety of firms work together to deliver value in the sector. Although B2B relationships were traditionally considered synonymous with dyadic partnerships, the extant literature has now evolved to study more complex networks of both health care and non-health-care firms. Whilst traditional buyer-seller relationships with some component of repetitive buying behaviour have received extensive attention from scholars for quite some time (Almomani, 2019; Şengün and Nazli Wasti, 2009; Sohn *et al.*, 2013; Wang, 2018), we observe that tripartite vertical relationships, such as the ones observed between universities, biotechnology firms and pharma firms (Stuart *et al.*, 2007) or those between labs, manufacturers and pharmacists (Ruiz-Alba *et al.*, 2019) have also been receiving increased attention. This indicates that greater decentralisation is occurring, whereby various firms band together to serve different purposes in the value chain rather than doing everything themselves. Here, a value chain is the list of all processes that extend from R&D to customers (Porter, 1998b).

Another stream of studies has focussed on investigating the portfolio of enterprises (de Leeuw *et al.*, 2019; Ferrand *et al.*, 2009). Such research has found that pharmaceutical firms tend to widen their portfolio of inter-organisational relationships under uncertain external technological environments (de Leeuw *et al.*, 2019). However, the same study argued that pharmaceutical firms reduced all types of alliances when faced with firm-level technological change, indicating that alliances may be used as a risk coping mechanism. This is further supported by studies (Alinaghian and Razmdoost, 2018) that have found that network-oriented resources lead to higher firm-level dynamic capabilities. These results give us a reason to believe that dynamic capabilities as a theory (Teece *et al.*, 1997) need to be further used to understand how firms use their networks to recombine their internal and external resources. Furthermore, attention is also needed to understand how these dynamic capabilities are used by different actors in the network. Figure 4 presents the role of different firms in the health-care value chain.

Moreover, the type of partners may be from the same kind of sub-sector, sector or from a different one entirely. An example of the same kind of firms cooperating with each other is of two pharmaceutical companies pooling their resources and talent to develop a drug (Sivakumar *et al.*, 2011). In such instances, both partners have the same goals and try to extract as much personal benefit as possible, in addition to the mutual benefits of their partnership (Roijakkers *et al.*, 2005; Ryu *et al.*, 2020). On the other hand, an example of non-similar organisations entering into alliances may be an industry-university (Ferrand *et al.*, 2009) or industry-government partnership, wherein both partners may have different goals and try to optimise their own benefits (Kronlid and Baraldi, 2020). Other types of non-similar firms discussed in the literature are law firms which provide legal services to health-care firms (Koku, 2009). In addition, organisations can also cooperate at different levels to enable smoother service delivery. A good example is a policy-enabled network between primary and secondary health-care providers in the UK (Zolkiewski, 2004). Furthermore, the type of partners can influence various alliance outcomes such as innovation (Shin *et al.*, 2016). However, too much diversity in partners can lead to redundancies (Sabidussi *et al.*, 2018), indicating that there might be something called an "optimum number" for a particular purpose of forming a relationship.

Another interesting aspect of B2B partnerships is linked with the need for sustainable health-care requirements, which can be

Figure 4 Role of different firms in the health-care value chain



difficult to achieve if both partners are profit-maximising in nature. In this regard, the literature is seeing a shift from short-term economic goals through B2B or business-to-government interactions towards medium and long-term interactions to achieve sustainability goals (Guercini *et al.*, 2020). It may be due to this reason that interest in public-private interactions has now increased, with these interactions in the health-care sector receiving enhanced attention from scholars (Guercini *et al.*, 2020).

5.1.2 Purpose of the business-to-business relationship

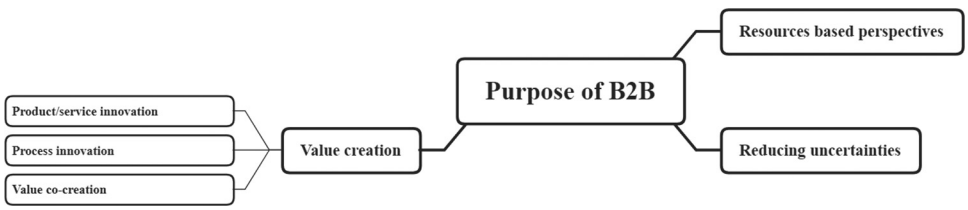
A review of the selected studies reveals that most studies have examined the behaviour of firms engaged in B2B relationships. By contrast, very few have investigated how these alliances come into existence in the first place (Ramos *et al.*, 2013). Firms may have significant purposes for collaborating, such as R&D collaboration, which can also lead to improved financial performance (Sivakumar *et al.*, 2011). Furthermore, alliances can help deliver services more effectively, as in the case of children's behavioural health agencies, as shown by Bunger *et al.* (2014). In sum, past studies have revealed that health-care firms engage in collaboration for one of the following outcomes:

- value creation, including co-creation and social value creation;
- a resource-based perspective; and
- reducing uncertainty. Figure 5 illustrates the various purposes of B2B relationships.

5.1.2.1 Value creation and co-creation. Value creation can be achieved through technological product innovation (Paruchuri, 2010; Zeng *et al.*, 2019), service innovation (Zolkiewski, 2004), process innovation (Rothaermel and Boeker, 2008) and value co-creation (Pilon and Hadjielias, 2017; Ruiz-Alba *et al.*, 2019). External knowledge from other firms, in particular, has been documented as having a positive relationship with innovation. For example, Xu *et al.* (2013) argued that external knowledge has an inverted U-shape relationship with both incremental and radical innovation. The relationships in these types of innovation can be either of cooperation or "coopetition" (Chen *et al.*, 2021). Cooperation usually occurs between organisations offering different values in the industry or with a partner outside the industry. Several types of such relationships have been explored in the literature, including universities and the pharmaceutical industry for R&D (MingJi and Ping, 2014) and hospitals and start-ups in the digital domain to offer better services (Ruiz-Alba *et al.*, 2019).

The other type of relationship for innovation is that of simultaneous cooperation and competition or coopetition (Bengtsson and Kock, 2000; Ritala *et al.*, 2014). In coopetitive relationships, the nature of cooperating firms is similar, with each party acting as direct competitor. Several studies have examined such relationships and how different firm-level and environmental factors impact their joint value creation. Some research interest has also been received on the coopetitive relationships of firms with multimarket contact (Ryu *et al.*, 2020).

Figure 5 Purpose of B2B relationship



Contrary to expectations, the research has revealed that such firms make suitable coopetition partners. For example, Ryu *et al.* (2020) argued that rival firms with contacts in multiple markets would exercise mutual forbearance out of fear of retaliation, and therefore, are less likely to deviate from mutual contracts and are more likely to have successful coopetition agreements.

Social value creation through B2B relationships is also an important aspect of the health-care sector beyond hospitals and pharmaceuticals alone; rather, it is fundamental to human well-being. In this context, firms in this sector have been observed to enter into a cooperation agreement for better value delivery. For instance, cooperation between primary and secondary health-care providers in the UK and funding providers was formed to create a service network to enable a better delivery of health care (Zolkiewski, 2011). However, studies in this context are limited mainly to the UK, and thus provide context-dependent results.

5.1.2.2 Resource-based perspective. B2B relationships in health care are often vehicles for the exchange and sharing of resources and competencies (Franco and Haase, 2015; Rothaermel, 2001; Rothaermel and Boeker, 2008). Due to this, firms tend to look for other firms with whom they have some resource complementarity (Sabidussi *et al.*, 2018), implying that some of the resources that the partner possesses go well with the existing resource base of the concerned firm. Such complementarity can open new avenues for firms. For instance, the use of complementary capabilities can be an effective way to enter into emerging technologies (Anand *et al.*, 2010).

Research examining this aspect is generally guided by the resource-based view (Barney, 1991), which states that resources and the quest for them will drive the firm's pursuit of sustained competitive advantage. It follows, therefore, that resource rarity plays a significant role in alliance selection and performance (Alinaghian and Razmdoost, 2018). In the case of health-care firms, depending on the nature of the health-care businesses, such resources can include manufacturing capability, R&D ability or the ability to run a unique process (Alinaghian and Razmdoost, 2018).

Despite the argued usefulness of considering resources as a basis for entering into B2B relationships, scholars have noted that in the case of high tech industries, a resources-based theorisation may not be ideal, with dynamic capabilities offering a better theoretical framework instead (Alinaghian and Razmdoost, 2018; Teece *et al.*, 1997). Herein, the dynamic capabilities perspective argues that resources tend to become obsolete over time, and thus cannot serve as the basis for sustained competitive advantage. Therefore, firms' strategies should be driven by capabilities rather than resources. The capabilities allow firms to quickly to repurpose and deploy resources (Teece *et al.*, 1997). Expressed differently, it is important for firms to have the ability to reconfigure their resources according to changes within the industry. However, in the case of B2B relationships in health-care firms, we see that resource rarity and versatility also influence the kind of network-based dynamic capabilities that a firm can develop (Alinaghian and Razmdoost, 2018). This indicates that unique resources are still valuable for attracting network participants in the health-care industry, which can, in turn, help firms develop dynamic capabilities (Alinaghian and Razmdoost, 2018).

5.1.2.3 Reducing uncertainty. The health-care industry is characterised by rapid changes and uncertainty. For instance, innovation in pharmaceutical firms is often market-distant and its success cannot be known ex ante (Kloyer and Scholderer, 2012). Thus, health-care firms, particularly pharmaceutical firms, have been known to enter into partnerships and alliances in times of technological changes (Anand *et al.*, 2010). However, such partnerships are characterised by complex contractual relationships, which can have an immense cognitive load in terms of the processing of lengthy contracts (Hagedoorn and Hesen, 2011). Given the complexity of contracts and their role in tackling uncertainty, the research has focussed to some extent on understanding alliance formation due to uncertainties. For instance, risk-sharing as a way of tackling uncertainty is considered to be a major part of a contract in pharmaceutical firms, especially when the drug involved is new or experimental (Pilon and Hadjielias, 2017).

5.1.3 Limitations and gaps related to the types and purpose of business-to-business relationships

Based on a critical review of the relevant literature, we identified five key gaps that need immediate attention. Firstly, very few studies have examined how firms meet in the first place and formalise alliances (Ramos *et al.*, 2013). In other words, the engagement process between the B2B alliance partners before the alliance is actually formed has remained obscure in the research, despite the fact that it can offer important managerial inputs. Furthermore, only one study (Gilsing *et al.*, 2016) has tracked the evolution of the B2B alliance from beginning to end, leaving much to be desired in the research on the temporal journey of a B2B relationship in the health-care sector. For instance, Kronlid and Baraldi (2020) showed that the longer the time available, the easier it is for government and private drug development alliances to form lasting engagements as time constraints make day-to-day interaction difficult. However, considering that these results are related to public-private partnerships, the gap concerning the temporal aspect in other types of alliances remains. Based on these gaps and our understanding of the literature, we propose the following PRQs:

PRQ1. What are the challenges and impediments faced at the inception of B2B relationships in the health-care sector?

PRQ2. How are potential alliance partners identified, vetted and selected?

PRQ3. What is the influence of time constraints and the nature of the partners involved in the outcomes of the B2B relationships?

Secondly, there is limited understanding of some types of B2B relationships, such as coopetition. For instance, as Chen *et al.* (2021) have argued, the conceptualisation of coopetition as a trade-off between competition and cooperation may be flawed. This is because firms may compete in some respects and choose to cooperate in others. Thus, it is important to consider a more granular view and consider the functional area of cooperation and competition. This is an important gap as direct competitors may increasingly be required to enter into such alliances to enhance their capabilities in the changing landscape of the

health-care sector. Consequently, we suggest the following PRQs to increase the understanding of this type of B2B relationship:

PRQ4. Does considering cooperation and competition as parallel constructs impact the outcomes compared to considering competition as a single construct?

PRQ5. In what situations can coopetition as a form of B2B partnership enhance value more than other ways of achieving the same outcome, and in what situations can coopetition erode value?

Thirdly, in the case of cross-industry partnerships, most of the studies have focussed on the partnership between governments and universities. Little attention has been given to other parties, such as public relations, law firms and funders. However, considering the importance of social media and the critical nature of health care from a social perspective, it is now imperative for health-care firms to have in-house social media teams or a third-party vendor to manage the firms' reputation and other aspects of public relations. Such relationships are likely to have a direct impact on brand image and consumer perception, and therefore, warrant further inspection.

Another key issue is that the sustainability implications of alliances have remained under-explored (Rodríguez *et al.*, 2021). This type of outcome is important because health-care firms need extensive waste disposal solutions, which are often carried out through third-party operators (Abd El-Salam, 2010; Chaerul *et al.*, 2008). If these firms form the right kinds of alliances for this purpose, they can enhance their image as sustainable firms are more likely to be perceived favourably by stakeholders (Park and Kim, 2016). Cognisant of such gaps in the current knowledge, we propose the following PRQs for future research:

PRQ6. Which are the other businesses with which health-care firms enter into business alliances and what are the outcomes that can be sought through these alliances?

PRQ7. What are the unique benefits that social media management/public relations firms offer to health-care firms as alliance partners?

PRQ8. What are the sustainability parameters that health-care firms should mandate whilst entering into the B2B alliance for waste disposal?

Fourthly, whilst scholars have examined both dyadic and tripartite B2B relationships in the health-care sector, little is known about the concept of virtual corporations in the sector. As virtual corporations represent an information technology-based network of partners who come together temporarily for some specific orders/project, this type of B2B alliance could be of interest in the evolving milieu where the intensity of the COVID-19 pandemic has made it necessary to form alliances that are geographically dispersed and require simultaneous and co-ordinated work. Thus, the lack of studies on virtual corporations is a critical gap that needs to be addressed expeditiously. We, therefore, suggest the following PRQs that require research focus:

PRQ9. What is the nature of the virtual corporation in the health-care sector?

PRQ10. What is the structure of the decision-making processes in these virtual corporations?

PRQ11. How have the firms in the sector handled the issues pertaining to intellectual property integrity and knowledge spillovers in virtual corporations?

Fifthly, whilst some of the reviewed studies have examined how firms use B2B networks as an uncertainty coping mechanism, these studies have focussed exclusively on pharmaceutical firms. In comparison, other types of firms, such as hospitals, have not been examined. It would be interesting to see if hospitals have a different way of organising their resource networks during uncertainties, especially in the face of a health crisis such as the COVID-19 pandemic, wherein several scenarios may unfold (Crick and Crick, 2020). Thus, we suggest the following PRQs:

PRQ12. How can hospitals and other health-care firms leverage B2B relationships in various scenarios expected to unfold in the case of a health crisis, such as the COVID-19 pandemic?

PRQ13. How have health-care B2B relationships changed with the COVID-19 pandemic presenting unprecedented uncertainty?

Finally, the existing literature is also deficient in how governments may be required to supervise and enter into partnerships with profit-maximising health-care entities that may not engage in sustainable health-care practices or that might not be in societal interest. We suggest that this gap in the literature be addressed by examining the following issues:

PRQ14. What are the supervisory measures that governments can introduce to ensure that B2B alliances in the sector provide sustainable health care with reasonable profitability?

PRQ15. How can changes in government strategy and policy interventions influence B2B relationships?

5.2 Pertinent issues in continued business-to-business relationships

The preceding theme was dedicated to understanding the types and purposes of B2B relationships in the health-care sector. However, this gives only a partial picture of B2B interactions. To remedy this, we now delve deeper into various issues that arise in B2B interactions in the health-care sector. For easier comprehension, we have classified the issues into four categories under this theme: trust, disparity of power and misappropriation of value, knowledge spillovers and other issues.

Trust

Several studies included in the review have investigated governance issues in B2B relationships. One of the major constraints that have been noted in these relationships is the lack of trust between the concerned parties (Adobor, 2005;

Kronlid and Baraldi, 2020). If partners in a B2B agreement (particularly alliances such as joint ventures) feel that other partners are appropriating more value than they are, they may reduce their contribution to the partnership (Arslan, 2018). Value appropriation is thus a serious concern in B2B relationships, especially for health-care-based alliances where value creation and fair value appropriation go hand-in-hand (Zolkiewski, 2011). However, the impact may be accentuated in the health-care industry because of its highly uncertain and high-tech nature. Another way that a lack of trust arises in a B2B relationship is due to the different nature of partners. For instance, in an R&D collaboration between industry and university, the industry partner wants to create a marketable product as soon as possible, whereas the university would rather publish the findings first, thereby creating an inherent conflict of expectations (Kronlid and Baraldi, 2020). Furthermore, as contracts are often incomplete and do not consider all eventualities, it may easily lead to opportunistic behaviour amongst the parties involved (Williamson, 1979).

The disparity of power and misappropriation of value

The second issue arises from the disparity of power between the actors. If some network actors possess more power in the network due to their size or resources, they can appropriate more value, and thus alienate their partners (Zolkiewski, 2011). It is, therefore, essential to understand who wields power and how it can be used in a network to remain in control of the flow of value (Samant and Kim, 2020).

Adegbesan and Higgins (2011) rendered some structure to the issue by discussing the relative scarcity, superior complementarity and bargaining power of the partners with respect to the alliance resources created. However, this view ignores the firm-level contextual variables that may impact the power dynamics. For instance, in their study of US pharmaceutical firms, Diestre and Rajagopalan (2012) revealed that, although new firms want an established partner for R&D alliance, they have to face the fact that the established partners are willing to use their skills only if it is worth the effort, thus shifting the power centre in their favour. Similarly, Roijakkers *et al.* (2005) observed that firms of different sizes do not repeat interactions in a high-tech industry, such as pharmaceutical, which indicates that similar firms make better partners. This creates a dual market structure, wherein large firms usually form repeated interactions with other large firms and small firms do the same with other small firms.

Another factor that can influence the private benefits drawn by firms from the B2B alliance is firm resource and capability. Existing evidence has indicated that the absorptive capacity of the firm, the commitment to exchanging knowledge and repeated engagement can help regulate the appropriation of value (Samant and Kim, 2020). However, more attention is needed to understand how such dynamics would vary with time (Kronlid and Baraldi, 2020).

In addition to the power issues, value appropriation can also be influenced by the uncertain nature of the health-care industry. Innovation projects worked on today are usually market-distant and can lead to opportunism, particularly in buyer-seller relationships. However, strict contracting can help minimise this issue. For instance, Kloyer and Scholderer (2012) investigated the relationship between German biotechnology and pharmaceutical firms to show that assigning patents ex ante to the supplier can help mitigate opportunism.

Knowledge spillovers

Knowledge management is crucial in B2B relationships (Quintana-García and Benavides-Velasco, 2011). In particular, the issue of knowledge spillover is a problem in business networks (Lowman *et al.*, 2012), wherein knowledge is unintentionally transferred between firms in B2B relationships. This problem is especially acute in networks. For instance, Paruchuri (2010) showed that spillover is a function of the centrality of the firm in the network and innovation in a network has an inverted U-shaped relationship with centrality. Herein, centrality refers to the importance of a firm in the network based on how many other firms it is connected with (Borgatti, 2005; Tsai *et al.*, 2019). Firms with high centrality, i.e. firms connected to several others, may face the issue of unintentional spillover more than firms with lower centrality (Paruchuri, 2010). These results are also supported by Dong and Yang (2016) for pharmaceutical firms in the USA, where they found that centrality leads to spillovers. Furthermore, this relationship is moderated by the number of connected firms that are not connected to each other (Paruchuri, 2010). In sum, knowledge spillover in the health-care B2B ecosystem seems to be a complex issue, which depends on both the number of B2B partners and the degree of centrality in the network. Therefore, initial partner selection is likely to play a key role in knowledge spillover at a subsequent level.

Other issues

Other issues that have received some attention are:

- the increasing popularity of digital media, the internet and e-commerce in B2B relationships (Cullen and Taylor, 2009);
- B2B clusters of a variety of firms with varying degrees of relationship ties (Ferrand *et al.*, 2009); and
- the role of formal and informal institutions in the outcomes of the alliance (Filiou and Golesorkhi, 2016).

Another issue that has received some attention concerns the likelihood of repeated ties or the loyalty of the firms involved, i.e. how likely are two firms to engage in repeat interactions. Loyalty may be impacted by a variety of factors, including firm-level internal factors such as brand image and satisfaction (Cassia *et al.*, 2017) and contextual factors such as firm size. Roijakkers *et al.* (2005), for example, showed that biopharmaceutical firms tend to repeat ties with other pharmaceutical firms of the same size.

5.2.1 Limitations and gaps related to pertinent issues in continued business-to-business relationships

A critical review of the selected studies has revealed various limitations and gaps related to pertinent issues in continued B2B relationships. The gaps exist in the case of all of the issues discussed above, namely, trust, disparity of power, misappropriation of value and knowledge spillovers. We, thus contend that there are six visible gaps that need immediate attention. Firstly, whilst scholars have noted the existence of opportunistic behaviour in the B2B relationship, it has been mainly explained through TCE, largely ignoring the role of trust as a means of reducing such behaviour. In addition, the understanding of opportunistic behaviour in such relationships

is also limited. This is a serious gap, given the high-tech nature and importance of intellectual property in the health-care sector, which is likely to amplify the role of trust in B2B relationships. Moreover, a better understanding of trust as a way of reducing issues in such a relationship can be critical because once a firm exhibits opportunistic behaviour, it may become difficult for it to find partners who are willing to engage with it again. Due to this, we suggest the following PRQs to increase the understanding of opportunistic behaviour and the role of trust in B2B relationships in the sector:

PRQ1. What are the gains/conditions that compel or lure health-care firms to indulge in or avoid opportunistic behaviour in B2B relationships?

PRQ2. What are the key factors that impact the decision of firms to indulge in opportunistic behaviour in B2B relationships with firms both within and outside the sector?

PRQ3. What are the key checks and balances that can be introduced as trust-enhancing measures in B2B relationships to reduce the scope for opportunistic behaviour?

PRQ4. How is the opportunistic behaviour of a B2B partner "punished" by other firms in the relationship/network?

Secondly, although prior studies have noted that opportunism may manifest differently at various stages of the innovation process for which the alliance has been created, the existing research has not focussed on how to value misappropriation unfolds as the partnership progresses. This gap needs to be addressed because misappropriation at an advanced stage of partnership can put the entire project at peril by creating the possibility of large losses. Hence, we suggest the following research questions deepen the related literature:

PRQ5. How do the dynamics of (mis)appropriation change over time in B2B relationships in the sector?

PRQ6. How do the nature of the alliance, type of project and firm size affect the dynamics of (mis)appropriation over time?

PRQ7. What are the circumstances surrounding value trade-off, i.e. one firm in an alliance allowing a partner to appropriate more value in one phase of the partnership so that it can extract more value later on?

Thirdly, the current understanding surrounding knowledge spillover is rather limited. For instance, we still do not understand if the number of partners of each type has an impact on the possibility of knowledge spillover. We are also not sure if a firm can use its centrality to tackle the issue of knowledge spillover. For example, can a firm threaten to pull out of the network (thereby collapsing it) to make its partners agree to a stronger knowledge protection contract, such as a non-disclosure agreement? Such a gap in understanding creates serious intellectual property rights issues. We, thus suggest the following research questions, which, when investigated, can help increase the ability of firms to protect themselves against unintended knowledge spillovers:

PRQ8. What kind of alliances is more susceptible to knowledge spillovers?

PRQ9. What is the critical number of B2B partners beyond which knowledge spillover can outweigh the benefits of the said alliance?

PRQ10. How can firm leverage its centrality to negotiate better knowledge spillover protection?

Fourthly, in addition to the gaps related to trust, misappropriation and spillover issues, there are gaps related to other pertinent issues, such as the scope of an alliance, which spans its formation, operation, termination and post-termination. For instance, the existing research does not consider how partners interact after terminating their partnership (Parameswar *et al.*, 2018). Similarly, a limited number of insights are available on B2B clusters with a variety of firms with varying degrees of relationship ties (Ferrand *et al.*, 2009) and the role of various institutions in the outcomes of the alliance (Filiou and Golesorkhi, 2016). This limited understanding of such aspects may hinder strategic and regulatory decision-making. Thus, we suggest the following research questions that can increase the accumulated understanding of the scope of such alliances:

PRQ11. What are the operational aspects of the termination of health-care B2B relationships both in the case of a natural progression and a sudden breakdown?

PRQ12. How are market contacts between partners handled post-termination of their alliance?

PRQ13. What is the extent of the existence of B2B clusters in the sector, and which are the verticals where these are more prominent?

PRQ14. How can formal and informal institutions act constructively to affect the outcomes of B2B alliances in the sector?

Fifthly, whilst some studies have discussed the likelihood of repeated ties or the loyalty of the firms to their past alliance partners, less is known about the factors that may enhance such loyalty. Admittedly, scholars have noted that loyalty to alliance partners is affected by firm-level internal factors such as brand image and satisfaction (Cassia *et al.*, 2017) and contextual factors such as firm size (Roijakkers *et al.*, 2005); however, more insights are required to evaluate the possibilities of repeat alliances. Thus, we suggest the following research questions:

PRQ15. What are the key market-related factors that drive firms' decisions to have repeated B2B partnerships with their previous partners?

PRQ16. What role do repeat alliances play in the polarisation of power in the health-care sector?

Finally, whilst there is an increasing debate on the role of alliances in promoting different kinds of innovations, the extant

literature does not offer insights into how the type of innovation affects the kind of alliance being entered into or its dynamics. To address this gap, we suggest that future researchers should contemplate addressing the following research questions:

PRQ17. How can alliances be leveraged in the sector to induce radical innovation?

PRQ18. How does the type of innovation (e.g. incremental versus radical) affect the nature and underlying dynamics of B2B alliances formed in the sector?

6. Conceptual framework: business-to-business health-care ecosystem framework

We have summarised the findings from our critical synthesis of the selected studies on B2B relationships in health care by creating a conceptual framework to support theory and practice in the area. Our framework flow is adapted from the antecedents-process-outcome model (Kotlar *et al.*, 2018) to provide a sequential and managerially relevant view of the variables of interest. As the review is focussed on governance structure, we further contend that TCE (Williamson, 1979) provides a suitable theoretical background to theorise and conceptualise the associations in the framework. The relevance of TCE in the present context also comes from the fact that it recommends governance structures for repeated transactions and highlights the need for hybrid structures, such as alliances and partnerships (Williamson, 1979, 2002). At the same time, TCE recognises that opportunistic behaviours in such alliances are plentiful and harm the interests of the involved firms. This aligns suitably with our findings, revealing that the B2B relationships in the health-care sector represent an ecosystem of interacting firms tied by a myriad of contractual relationships for mutual benefit but that are also vulnerable to the opportunistic behaviour of their partners. To summarise, our conceptual framework, entitled *B2B healthcare ecosystem framework*, is guided by TCE and visually presents the ecosystem of interacting firms in the health-care sector through three main components:

1 the antecedents in various associations;
2 the types of organisations involved and the relationships between them (the process); and
3 the outcomes of such relationships (Figure 6).

In addition, institutional and cultural factors representing contextual moderating variables have also been included as a fourth component in the framework to present a more comprehensive and informative visual. The value of our proposed framework comes from the following two aspects: firstly, as the review concentrated on why health-care firms engage in B2B relationships, the framework summarising the antecedents and the consequences presents a relevant and complete spectrum of the dynamics surrounding these alliances in the sector. Secondly, it brings together a seminal theory, TCE, which is well-respected by practitioners and the systems approach, which is a well-diffused managerial tool, to bring out the potential interactions amongst a variety of partners, guided by well-defined antecedents and expectations and clearly spelt results and outcomes. The four components of the framework are described below.

6.1 Antecedents

In the thematic discussion, we uncovered various purposes for engaging in B2B relationships, namely;

- value creation and co-creation;
- a resource-based perspective; and
- reducing uncertainties.

We draw parallels for these antecedents with TCE. TCE theorises that governance structures for transactions are decided by three factors:

1 asset-specific investment;
2 the level of uncertainty; and
3 the number of transactions (Williamson, 1979, 2002).

We argue that the reason for engaging in B2B relationships presented can be classified into one of the three factors predicted by TCE. Collaborating for innovation, for instance, would fall into both reducing uncertainty and building transaction-specific assets. However, we observed that the number of transactions as a cause for engaging in B2B relationships had not received adequate research attention, with the majority of the studies exploring asset and capability complementarity or environmental uncertainty.

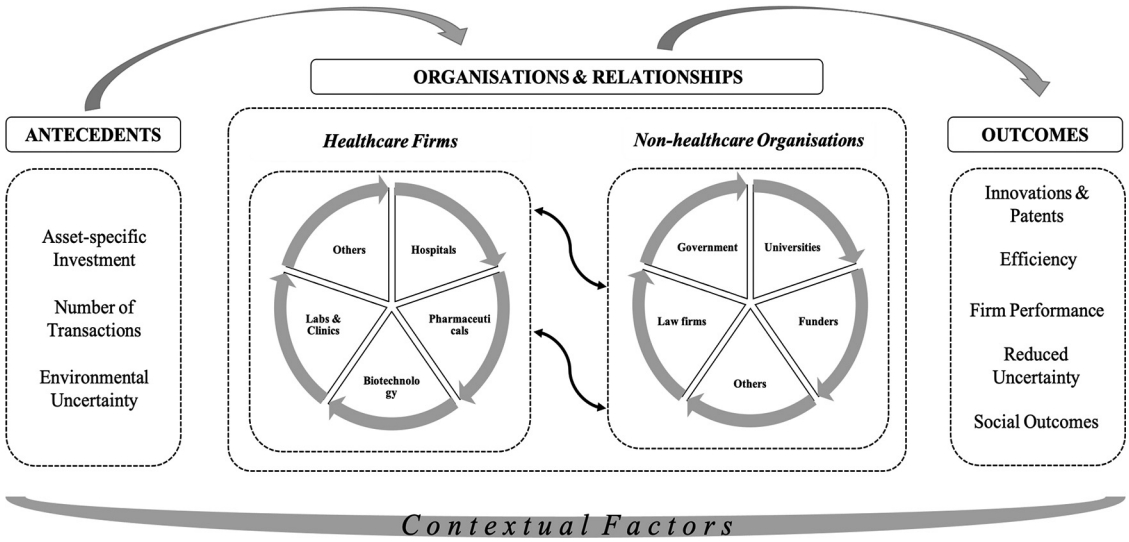
6.2 Types of organisations involved and the relationships between them

As discussed in the theme on the types and purposes of B2B relationships, health-care firms can have alliance partners from the same industry or from different industries depending on the purpose. In this regard, we observe that whilst an alliance with firms in the same industry can help in their core activities, an alliance with firms in other industries can be useful in the case of both core and non-core activities. However, the majority of the research so far has remained focussed on alliances with governments and universities, with some interest in law and financial firms. In addition, given the cross-industry nature of such relationships and sustainability concerns and the publicly sensitive nature of the sector, an alliance with social media management, public relation and waste management firms may gain prominence in times to come.

6.3 Outcomes

Firms receive a variety of benefits from engaging in B2B activities, particularly performance outcomes, such as enhanced efficiency, innovation and new patents, which have been recognised as key outcomes of B2B alliances by past studies (Djurian *et al.*, 2020; Zeng *et al.*, 2019; Zolkiewski, 2004). Scholars have also noted other benefits, such as a reduction in market side uncertainty. Given the evolving context of the COVID-19 pandemic and the role that health-care firms have been called upon to play, we contend that greater attention is needed on how B2B alliances can create social value. For instance, a variety of health-care firms (although for-profit), including Pfizer, Moderna, Serum Institute of India, etc., partnered with governments to manufacture the COVID-19 vaccines on a large scale. More insights are needed on how these relationships were negotiated and what outcomes they presented. Similarly, research is also

Figure 6 B2B health-care ecosystem framework



required to understand how health-care firms can create shared value for multiple stakeholders (Porter *et al.*, 2011).

6.4 Contextual factors

The contextual factors that may impinge upon various aspects of these relationships can be classified as:

- firm-specific factors;
- relationship-related factors;
- institutional factors; and
- cultural factors.

Firm-specific factors refer to aspects, such as firm size, firm age and characteristics of the firms under consideration. Relationship-related factors refer to the issues that may come up at the inter-firm level such as trust, knowledge leakage or contract type. Institutional factors refer to aspects, such as policy support, legalities and the rule of law and corruption (Ayyagari *et al.*, 2011; North, 1992). Although prior literature has examined the role of institutions to some extent, little attention has been paid to aspects, such as legal provisions and rules. Finally, with regard to cultural factors, we note the limitations associated with single-country studies, with the majority of the studies being focussed on the USA. This indicates the need to broaden the geographic scope of investigations in the area, especially amongst emerging market countries that are known to have institutional voids (Gao *et al.*, 2017).

7. Conclusion

The purpose of our review was to understand how, why, when and with whom health-care firms form an alliance. To this end, we were guided by two research objectives divided into four research questions. To respond to the identified research questions, we first generated and analysed the research profile of the selected literature and highlighted the underlying gaps that needed to be addressed. Next, we undertook a content analysis of the selected studies to delineate the thematic foci. Based on our results, we uncovered two key themes with multiple sub-themes:

- the types and purposes of B2B relationships; and
- the pertinent issues in continued B2B relationships.

We then brought forth the various nuances of the selected literature related to types of partners, value creation, the resources-based perspective, uncertainty reduction, trust, misappropriation of value, knowledge spillover, etc. Along with a detailed discussion on the themes, we revealed the visible gaps in the literature and suggested PRQs to motivate and guide future study. In sum, we first sought to understand how the literature has evolved over the years and observed that the research in the area has been largely contributed to by scholars from the area of strategic management, whose main focus was to examine alliances rather than health care as a strategic context. Finally, we brought our findings together through a conceptual framework, which we entitled the "B2B healthcare ecosystem framework". The framework links the entire narrative back to the transaction cost argument for the existence of these B2B structures and gives a bird's eye overview of the research area.

Our review offers useful implications for theory and practice, as discussed below.

7.1 Theoretical implications

The current review contributes to the body of literature investigating B2B relationships in health care in the following ways. Firstly, although there are a number of systematic reviews addressing B2B relationships (Aarikka-Stenroos and Ritala, 2017; Keränen *et al.*, 2012; Pandey *et al.*, 2020), none of them has focussed on the health-care sector. Given the industry's high-tech nature and the ongoing pandemic, it is now more pertinent than ever to understand how the health-care industry works with other firms from its own and other industries.

Secondly, by broadly defining the health-care sector to include pharmaceutical firms as well, we have attempted to present a more comprehensive picture of how health-care firms interact with each other. In this regard, we have brought forth both the benefits and the perils of such alliances.

Thirdly, we uncovered the fact that the majority of studies have focussed on the pharmaceutical sector due to the convenience of data availability, thereby limiting the insights that are more relatable to the health-care sector as a whole. We underscore the fact that the focus needs to be broadened and new studies need to consider various types of firms in the sector to make a more tangible contribution. To this end, we created a platform for future research by systematising the literature through two key themes divided into several subthemes.

Fourthly, by highlighting the gaps and limitations in the extant research and suggesting multiple PRQs, we contribute to the theoretical deepening of the area. In sum, our review catalyses new research that would focus on better explicating the purposes of B2B relationships, the types of organisations in B2B alliances with health-care firms and governance structure-related issues, and that would compensate the methodological trade-offs that the existing research had engaged in when driven by data and context-related conveniences.

Fifthly, we drew upon our evolved understanding of the area to formulate a comprehensive conceptual framework representing the health-care B2B alliance ecosystem. The framework provides a bird's eye view of the key aspects of health-care B2B alliances in terms of the key drivers, players, outcomes and contextual factors. Bringing these varied aspects of alliances together, with TCE and the systems approach as a theoretical anchor, our review visualises the literature in a lucid and useful manner. Finally, we encourage and support future research by providing an extensive research profile of the existing literature and uncover the areas where greater focus is urgently required.

7.2 Practical implications

In this review, we not only summarise the roles of different types of health-care firms in the B2B alliance value chain and how this value chain can be "distributed" between enterprises to create value but also touch upon various issues that can arise after such alliances are formed. Therefore, our review provides four interesting implications for practising managers. Firstly, in Figure 4, we summarise the roles of various health-care firms in the value chain and how complementary firms can help each other better regulate these relationships. Managers in health-care firms can use this visualisation to better understand their firm's position in the industry and plan partnerships with their upstream or downstream neighbours as a result. By highlighting the right partner for the right task, we contend that our study will enable health-care firms and non-health-care firms wishing to partner with health-care firms to evaluate their potential partners in a better way.

Secondly, by highlighting the most common issues and challenges in B2B relationships and underscoring the pitfalls that may arise before or during a B2B engagement, we contribute to improving managerial decision-making. For instance, we synthesise the existing findings to reveal how the firms must face the challenges of opportunism in contracts by their alliance partners on the one hand and how they can use trust as a positive building block to help reduce the threat of opportunistic threat on the other. Furthermore, we shift attention to the issue of centrality in networks and the importance of understanding that having too many partners can increase the possibility of knowledge spillovers because of high centrality. By doing so, we suggest that managers contemplating B2B alliances should also focus on optimal centrality, as both low or high centrality may not be a value-creating proposition.

Thirdly, the timing of our review has increased its value and contextual relevance manifold as the COVID-19 pandemic has brought health-care firms under the spotlight and a very public debate has unfolded about the various alliances that pharmaceutical firms, governments and vaccine manufacturers have entered into, as guided by the dual-force of public health necessity and the opportunity for making a profit. By presenting the varied nuances of B2B alliances in the health-care sector, we lay the basis for managers to understand and better negotiate such alliances.

Finally, our framework, which summarises the entire health-care B2B relationship ecosystem, comprising antecedents, inter-firm relationships, outcomes and contextual factors, offers a ready reference for managers and regulators to understand the critical aspects of such alliances. This framework can be used by practitioners and policymakers alike to design business clusters (Porter, 1998a) to support B2B activity in the health-care industry. As engaging in B2B transactions is unavoidable for most health-care firms, the findings of our study bring together a convenient yet comprehensive compilation of the critical contractual and operational parameters that can enhance the value derived from such alliances.

7.3 Limitations and future research areas

The contribution of our review should be considered in light of the following limitations. Firstly, to maintain quality and robustness, we did not consider non-peer-reviewed literature and literature not published in English. We concede that relevant literature might have existed in these sources that could have contributed to the synthesised findings. Secondly, we limited our search to two digital databases: Scopus and WOS. Although these databases are very comprehensive, some studies could have been missed.

However, our review reveals that examining B2B relationships in a focussed context such as health care can reveal unique implications for the literature. Therefore, we suggest that future reviews may cover similar B2B relationships in other industries such as the automobile or technology industry. Another possible extension of this review can be to synthesise issues in particular types of relationships, for instance, dyadic or triadic relationships.

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